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KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

PROCEDURE FOR COMPLETING SECTION #10 OF THE PERMIT APPLICATION FOR A CLASS I NON-HAZARDOUS WASTE INJECTION WELL

Procedure #: UICI-14

Narrative:

The purpose of Section #10 of the application is to generate the geologic and geohydrologic information demonstrating the site of the proposed injection well has the characteristics suitable for the injection of wastes, including information demonstrating the wastes will be contained in the injection zone and the injection of wastes is not detrimental to the fresh and usable waters, the soils, or mineral production activities.

Procedure:

- As part of the information generated for Section #10, each of the following characteristics for a suitable injection site must be discussed, including an explanation as to whether or not the site has the necessary characteristics.

1. Injection interval sufficiently thick, with adequate porosity and permeability to accept waste at the proposed injection rate without necessitating excessive injection pressures.

2. Injection interval of large enough areal extent so that injection pressure is minimized and so that injection waste will not reach discharge areas.

3. Injection interval preferably "homogeneous" (without high-permeability lense or streaks), to prevent extensive fingering of the waste-vs-formation water contact, which would make adequate monitoring or prediction of waste movement extremely difficult or impossible.

4. Overlying and underlying strata (confining beds) sufficiently thick and impermeable, to confine waste to the injection interval.

5. Structural geologic conditions generally simple, that is a site reasonably free of complex faulting and folding.

6. Site is an area of minor to moderate earthquake damage and low seismic activity so that the hazard of earthquake damage or triggering of seismic events is minimized.

7. Slow lateral movement of fluid in the injection interval, under natural conditions, to prevent rapid movement of waste away from the injection site, possibly to a discharge area.

(Over)

8. Formation-fluid pressure normal to low so that excessive fluid pressure is not needed for injection.

9. Formation temperature normal to low so that the rates of undesirable reactions are minimized, including corrosion.

10. Wastewater compatible with formation fluids and minerals or can be made compatible by treatment, emplacement of a buffer zone or other means.

11. Formation water in the disposal formation of no apparent value, i.e. not potable, unfit for industrial or agricultural use, and not containing minerals in economically recoverable quantities.

12. Injection interval adequate separated from fresh and usable water zones, both horizontally and vertically.

13. Waste injection does not endanger present or future use of mineral resources (coal, oil, gas, brine, others).

14. Waste injection does not affect existing or planned gas-storage or freshwater-storage projects.

15. No unplugged or improperly abandoned wells penetrating the disposal formation in the vicinity of the disposal site, which could lead to contamination of other resources.

- The geology and geohydrology should first be evaluated on a regional basis and then examined at the local level in more detail. Maps and cross-sections available in the literature are acceptable for the regional evaluation. The evaluation on the local level requires constructing maps and cross-sections using information from available well control in the area. The area may encompass several townships around the injection well.

- The location of the injection well must be shown on cross-sections and maps.

- All maps and cross-sections must be clearly labelled and have a legend if appropriate.

- A reference must be provided for any equations used. All values and a reference for any values used in any equation must be provided.

- All information or conclusions taken from available literature must be referenced.

- Interpretations of all maps, cross-sections, and geohydrologic information must be provided. Describe what the information indicates and the significance in relation to the injection and containment of waste fluids.

- The depositional, structural and seismic history must be discussed in detail including the significance in relation to the injection and containment of waste.

- The predicted temperature of the injection zone can be calculated if there is no actual temperature information available from wells in the area.

- Considerable effort must be made to determine porosity and permeability of significant geologic units penetrated by the injection well, especially confining units and aquifers. This should be accomplished by evaluating wireline logs, core data, formation tests or other information for wells in the area. Always use any information available from the well itself. If these sources of information are not available, then literature values with appropriate references are acceptable.

- The concept of a confining zone is a zone consisting of multiple formations with alternating permeable and low permeability units or formations. The confining zone must also be significantly thick (>1000' in most cases). The top of the confining zone should be easily identifiable and mappable. The base of the confining zone is considered to be the top of the injection zone.

- In regards to the information required for all mineral owners that may be affected by the migration of waste over the life of the injection well, the one mile radius area of review is considered. If a mineral right is not leased or currently exploited, the landowners in most cases retains 100% ownership of the minerals and would still be impacted.

- The report on the results of a corrosion test on the injection well components can be satisfied by submittal of manufacturer's testing data demonstrating compatibility to a waste similar to what is proposed for injection. The data must be properly referenced and documented.

- In calculating injection zone pressure build-up, cone of influence, and predicted distance of wastewater flow from the injection well a common value used for the life of a well in these calculations is 20 years.

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